

Application Number 10/572761
Response to the Office Action dated 12/28/2007

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Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A light-emitting element comprising a light-emitting layer including a phosphor, and at least two electrodes,
the light-emitting element comprising at least two kinds of electrically insulating layers with different dielectric constants,
wherein one of the electrically insulating layers is the light-emitting layer, and one of the two electrodes is formed in contact with one of the insulating layers, and,
the phosphor is a porous light-emitting body, and
an AC electric field being applicable between the two electrodes to cause gas breakdown between the two electrodes to generate primary electrons, the primary electrons causing surface discharge in the porous light-emitting body in the light-emitting layer, so that secondary electrons and ultraviolet rays are emitted, and the emitted secondary electrons and ultraviolet rays exciting a luminescence center of the porous light-emitting body, so that the porous light-emitting body emits light.
2. (Original) The light -emitting element according to claim 1, wherein the at least two electrodes are formed on interfaces of the electrically insulating layers with different dielectric constants.
3. (Original) The light -emitting element according to claim 1, wherein the other insulating layer is a gas layer, a ferroelectric layer, or a dielectric layer with a relative dielectric constant of 100 or more.
4. (Original) The light -emitting element according to claim 3, wherein the ferroelectric layer or the dielectric layer is formed of at least one layer selected from a sintered layer, a

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mixed layer of a particle and a binder including a ferroelectric material or a dielectric material, and a molecular deposition thin film including a ferroelectric material or a dielectric material.

5. (Original) The light-emitting element according to claim 3, wherein the ferroelectric layer further includes a back electrode.

6. (Canceled)

7. (Currently amended) The light-emitting element according to claim 61, wherein the porous light-emitting body includes at least one gas selected from air, nitrogen, and an inert gas.

8. (Currently amended) The light-emitting element according to claim 61, wherein the porous light-emitting body is formed of a fine pore connected to a surface of the porous light-emitting body, a gas filled in the fine pore, and a phosphor particle.

9. (Currently amended) The light-emitting element according to claim 61, wherein the porous light-emitting body is formed of a phosphor particle or a phosphor particle coated with an insulating layer.

10. (Currently amended) The light-emitting element according to claim 61, wherein the porous-light-emitting body has an apparent porosity in a range of not less than 10% to less than 100%.

11. (Currently amended) The light-emitting element according to claim 61, wherein the porous light-emitting body is formed of at least one particle selected from a phosphor particle and a phosphor particle coated with an insulating layer, and an insulative fiber.

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12. (Original) The light-emitting element according to claim 1, wherein the light-emitting element is in an atmosphere under pressure, atmospheric pressure, or a reduced pressure, and is sealed entirely.

13. (Canceled)

14. (Original) The light-emitting element according to claim 3, wherein the gas layer is provided to have a thickness in a range of not less than 1 μm to not more than 300 μm .

15. (Original) The light-emitting element according to claim 1, wherein the light-emitting layer is divided into a plurality of parts by discharge separation means with respect to each pixel.

16. (Original) The light-emitting element according to claim 15, wherein the discharge separation means is formed of a partition wall.

17. (Original) The light-emitting element according to claim 15, wherein the partition wall is made of an inorganic material.

18. (Original) The light-emitting element according to claim 15, wherein the discharge separation means is formed of a space.

19. (Original) The light-emitting element according to claim 3, wherein the gas layer is partitioned by a rib in a thickness direction.

20. (Original) The light-emitting element according to claim 1, wherein the light-emitting layer emits light of at least red (R), green (G), or blue (B) separately.

21. (Withdrawn) The light-emitting element according to claim 1, wherein the at least two electrodes are arranged so as to sandwich the at least one dielectric layer and the

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light-emitting layer therebetween, and an AC electric field is applied so as to cause surface discharge in the light-emitting layer, whereby the light-emitting layer is allowed to emit light.

22. (Original) The light-emitting element according to claim 1, wherein the at least two electrodes are an address electrode and a display electrode, respectively.

23. (Currently amended) The light-emitting element according to claim 1, wherein one of the at least one electrode ~~two electrodes~~ is a transparent electrode arranged on an observation side.

24. (Original) The light-emitting element according to claim 3, wherein the gas layer is formed at at least one portion selected from a portion between the light-emitting layer and the observation side of the transparent electrode and a portion between the light-emitting layer and the back electrode.

25. (Currently amended) The light-emitting element according to claim 1, wherein the other electrically insulating layer is a ferroelectric layer, the light-emitting layer is a porous light-emitting layer, and the porous light-emitting layer is arranged in contact with the ferroelectric layer.

26. (Original) The light-emitting element according to claim 25, wherein at least one of the electrodes is arranged on the porous light-emitting layer so that an alternating electric field applied between the at least two electrodes also is applied to a part of the porous light-emitting layer.

27. (Original) The light-emitting element according to claim 25, wherein the at least two electrodes are formed so as to sandwich the ferroelectric layer and the porous light-emitting layer therebetween.

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28. (Original) The light-emitting element according to claim 25, wherein the at least two electrodes both are formed on the ferroelectric layer.

29. (Original) The light-emitting element according to claim 25, wherein the at least two electrodes both are formed at a boundary between the ferroelectric layer and the porous light-emitting layer.

30. (Original) The light-emitting element according to claim 25, wherein one of the at least two electrodes is formed at a boundary between the ferroelectric layer and the porous light-emitting layer, and the other electrode is formed on the ferroelectric layer.

31. (Original) The light-emitting element according to claim 1,
wherein one of the electrically insulating layers is a ferroelectric layer,
the at least two electrodes include a pair of electrodes and another electrode,
a pair of the electrodes are arranged so that an electric field is applied to at least a part of the ferroelectric layer, and
the other electrode is arranged so that an electric field is applied to at least a part of the light-emitting layer provided between the other electrode and at least one of a pair of the electrodes.

32. (Withdrawn) The light-emitting element according to claim 1, wherein a predetermined electric field or higher is applied to the light-emitting layer, so that electric charge transfer is carried out, whereby the light-emitting layer is allowed to emit light.

33. (Withdrawn) The light-emitting element according to claim 1, wherein an electron-emitting body further is provided toward the light-emitting layer, and the light-emitting layer is arranged adjacent to the electron-emitting body so as to be irradiated with electrons generated from the electron-emitting body.

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34. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body includes a cathode electrode, a gate electrode, and a Spindt-type emitter interposed between the two electrodes, and electrons emitted from the Spindt-type emitter by application of a gate voltage between the cathode electrode and the gate electrode are irradiated to the light-emitting layer, whereby the light-emitting layer is allowed to emit light.

35. (Withdrawn) The light-emitting element according to claim 34, wherein the Spindt-type emitter has a cone shape.

36. (Withdrawn) The light-emitting element according to claim 34, wherein the Spindt-type emitter is made of at least one metal selected from molybdenum, niobium, zirconium, nickel, and molybdenum steel.

37. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body includes a cathode electrode, a gate electrode, and a carbon nanotube interposed between the two electrodes, and electrons emitted from the carbon nanotube by application of a gate voltage between the cathode electrode and the gate electrode are irradiated to the light-emitting layer, whereby the light-emitting layer is allowed to emit light.

38. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body is a surface-conduction-type electron-emitting element, a gap is provided in a metal oxide film, and electrons generated from the gap by application of an electric field to an electrode provided on the metal oxide film are irradiated to the porous light-emitting body, whereby the light-emitting layer is allowed to emit light.

39. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body is made of a silicon microcrystal with an oxide film sandwiched between polysilicon with an oxide film, and electrons generated by application of a

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voltage to the silicon microcrystal with an oxide film are irradiated to the light-emitting layer, whereby the light-emitting layer is allowed to emit light.

40. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body includes a cathode electrode, a gate electrode, and a whisker emitter interposed between the two electrodes, and electrons emitted from the whisker emitter by application of a gate voltage between the cathode electrode and the gate electrode are irradiated to the light-emitting layer, whereby the light-emitting layer is allowed to emit light.

41. (Withdrawn) The light-emitting element according to claim 33, wherein the electron-emitting body includes a cathode electrode, a gate electrode, and silicon carbide or a diamond thin film interposed between the two electrodes, and electrons emitted from the electron-emitting body by application of a gate voltage between the cathode electrode and the gate electrode are irradiated to the light-emitting layer, whereby the light-emitting layer is allowed to emit light.